

SN 09/094,645

IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE

Applicants: **Hung-Ju Lee, Tihao Chiang**Case: **SAR 12598**Serial No.: **09/094,645**Filed: **June 15, 1998**Group Art Unit: **2713**Examiner: **B. Tung**

Title: **APPARATUS AND METHOD FOR OBJECT BASED  
RATE CONTROL IN A CODING SYSTEM**

ASSISTANT COMMISSIONER FOR PATENTS  
Washington, D. C. 20231

S I R:

DECLARATION UNDER 37 C.F.R. § 1.131

We, Hung-Ju Lee and Tihao Chiang, hereby declare as follows:

1. We are the Applicants of the above-captioned patent application.
2. We conceived of the complete invention as claimed in the above-identified patent application on or before February 14, 1997. Additionally, due diligence toward reducing the invention to practice was exercised from the conception date of the complete invention as well as the various portions thereof to a subsequent constructive reduction to practice of the invention as well as an actual reduction to practice.
3. To establish the conception date of the invention disclosed in the above-identified application that predates the filing date (February 14, 1997) of the US Patent 5,790,196 by Sun et al., "Adaptive Video Coding Method", issued August 4, 1998, we declare that the present invention was being tested on or before February 14, 1997. Specifically, various standard video sequences were obtained, stored and then applied as test sets to the present invention on or before February 14, 1997. The use of these standard video sequences to verify and gauge the performance of an image processing

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invention is generally practiced in this field. Namely, by using the same standard video sequences, various image processing inventions will share a common baseline for comparison purposes. Thus, actual reduction to practice of the present invention occurred on or before February 14, 1997.

The undersigned, Hung-Ju Lee and Tihao Chiang, hereby declare that all statements made herein of our own knowledge are true and that these statements made on information and belief are believed to be true and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent resulting therefrom.

3-31-99

Date

Hung-Ju Lee  
Hung-Ju Lee3-31-99

Date

Ti Hao Chiang  
Tihao Chiang

Kin-Wah Tong  
Thomason & Moser  
Attorneys at Law  
2-40 Bridge Avenue  
P.O. Box 8160  
Red Bank, New Jersey 07701

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- 3. To establish the conception date of the invention disclosed in the above-identified application that predates the filing date (February 14, 1997) of the US Patent 5,790,196 by Sun et al., "Adaptive Video Coding Method", issued August 4, 1998, we declare that the present invention was being tested on or before February 14, 1997. Specifically, various standard video sequences were obtained, stored and then applied as test sets to the present invention on or before February 14, 1997. A list of these standard video sequences are shown in Appendix A. The date next to each file is the date the**

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video file was obtained for testing. This list, as printed on March 9, 1999, is a printout of these stored files.

The use of these standard video sequences to verify and gauge the performance of an image processing invention is generally practiced in this field. Namely, by using the same standard video sequences, various image processing inventions will share a common baseline for comparison purposes. Specifically, some of the simulation results using these standard video sequences were subsequently compiled and presented in an internal proprietary Sarnoff report dated May 19, 1997 as shown in Appendix B. It should be noted that Appendix B only shows simulation results for the video sequences entitled "akiyo", "coastguard", "container", and "news", without any proprietary comments that accompanied the simulation results. Thus, actual reduction to practice of the present invention occurred on or before February 14, 1997.

The undersigned, Hung-Ju Lee and Tihao Chiang, hereby declare that all statements made herein of our own knowledge are true and that these statements made on information and belief are believed to be true and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent resulting therefrom.

6-23-99  
Date

6-23-99  
Date

Hung-Ju Lee  
Hung-Ju Lee

Ti hao Chiang  
Tihao Chiang

Kin-Wah Tong -  
Thomason & Moser  
Attorneys at Law  
2-40 Bridge Avenue  
P.O. Box 8160  
Red Bank, New Jersey 07701

## APPENDIX A

## content.txt

```

-rw-r--r-- 1 hjee 8363520 Jan 9 1997 hall_monitor_obj_0_qcif
-rw-r--r-- 1 hjee 33454080 Jan 9 1997 hall_monitor_obj_1_cif
-rw-r--r-- 1 hjee 8363520 Jan 9 1997 hall_monitor_obj_1_qcif
-rw-r--r-- 1 hjee 33454080 Jan 9 1997 hall_monitor_obj_2_cif
-rw-r--r-- 1 hjee 8363520 Jan 9 1997 hall_monitor_obj_2_qcif

news:
total 149312
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 news_obj_0_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 news_obj_0_qcif
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 news_obj_1_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 news_obj_1_qcif
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 news_obj_2_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 news_obj_2_qcif
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 news_obj_3_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 news_obj_3_qcif

singer:
total 0
stefan:
total 0

```

```

total 11
drwxr-xr-x 2 hjee 512 Feb 16 16:09 akiyo/
comm_res 30412800 Jan 10 1997 akiyo_obj_0_cif
comm_res 7603200 Jan 10 1997 akiyo_obj_0_qcif
drwxr-xr-x 2 hjee 512 Jan 9 1997 coastguard/
comm_res 30412800 Jan 10 1997 coastguard_obj_1_cif
comm_res 7603200 Jan 10 1997 coastguard_obj_1_qcif
-rw-r--r-- 1 hjee 0 Mar 9 10:16 content.txt
drwxr-xr-x 2 hjee 512 Aug 13 1998 dancer/
comm_res 30412800 Jan 10 1997 dancer_obj_0_cif
comm_res 7603200 Jan 10 1997 dancer_obj_0_qcif
drwxr-xr-x 2 hjee 512 Jan 9 1997 foreman/
comm_res 30412800 Jan 10 1997 foreman_obj_0_cif
comm_res 7603200 Jan 10 1997 foreman_obj_0_qcif
drwxr-xr-x 2 hjee 512 Jun 8 1998 news/
comm_res 30412800 Jan 10 1997 news_obj_0_cif
comm_res 7603200 Jan 10 1997 news_obj_0_qcif
-rwxr-xr-x 1 hjee 970 Aug 3 1998 rvio.c*
drwxr-xr-x 2 hjee 512 Aug 13 1998 singer/
comm_res 30412800 Jan 10 1997 singer_obj_0_cif
comm_res 7603200 Jan 10 1997 singer_obj_0_qcif
drwxr-xr-x 2 hjee 512 Aug 13 1998 stefan/
comm_res 30412800 Jan 10 1997 stefan_obj_0_cif
comm_res 7603200 Jan 10 1997 stefan_obj_0_qcif

akiyo:
total 74136
-rw-r--r-- 1 hjee 30412800 Jan 10 1997 akiyo_obj_0_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 akiyo_obj_0_qcif
-rw-r--r-- 1 hjee 30412800 Jan 10 1997 akiyo_obj_1_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 akiyo_obj_1_qcif

coastguard:
total 148672
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 coastguard_obj_0_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 coastguard_obj_0_qcif
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 coastguard_obj_1_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 coastguard_obj_1_qcif
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 coastguard_obj_2_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 coastguard_obj_2_qcif
-rw-r--r-- 1 hjee 30412800 Jan 9 1997 coastguard_obj_3_cif
-rw-r--r-- 1 hjee 7603200 Jan 9 1997 coastguard_obj_3_qcif

container:
total 205152
-rw-r--r-- 1 hjee 27520000 Jan 9 1997 container_obj_0_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 container_obj_0_qcif
-rw-r--r-- 1 hjee 27520000 Jan 9 1997 container_obj_1_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 container_obj_1_qcif
-rw-r--r-- 1 hjee 27520000 Jan 9 1997 container_obj_2_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 container_obj_2_qcif
-rw-r--r-- 1 hjee 27613184 Jan 9 1997 container_obj_3_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 container_obj_3_qcif
-rw-r--r-- 1 hjee 27523072 Jan 9 1997 container_obj_4_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 container_obj_4_qcif
-rw-r--r-- 1 hjee 27523072 Jan 9 1997 container_obj_5_cif
-rw-r--r-- 1 hjee 7603200 Jan 10 1997 container_obj_5_qcif

dancer:
total 0
filter:
total 65
-rwxr-xr-x 1 hjee 512 Jan 10 1997 changes*
comm_res 33154 Jan 10 1997 mpeg4.fi.c*
comm_res 34908 Jan 10 1997 mpeg4.filter*
-rwxr-xr-x 1 hjee 6671 Jan 10 1997 readme*

foreman:
total 55408
-rw-r--r-- 1 hjee 30412800 Nov 30 18:56 foreman_obj_0_cif
-rw-r--r-- 1 hjee 30412800 Nov 30 18:56 foreman_obj_1_cif

hall_monitor:
total 122616
-rw-r--r-- 1 hjee 34454080 Jan 9 1997 hall_monitor_obj_0_cif

```

## APPENDIX B - Page 1

David Saff Research Center Invention Disclosure

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**EACH PAGE MUST BE SIGNED BY EACH INVENTOR AND WITNESSED**

(1) Simulation results for low bitrate video coding:

sequence	object	target bits	actual rate	frame rate	PSNR
akiyo (QCIF)	VO0	10.00k	10.02K	53/75	35.32
	VO1				28.99
akiyo (QCIF)	VO0	24.00k	24.06k	99/100	37.24
	VO1				32.20
coastguard (QCIF)	VO0	48.00k	48.27k	91/100	28.72
	VO1				25.79
	VO2				27.45
	VO3				26.40
coastguard (CIF)	VO0	112.00k	113.70k	72/150	27.14
	VO1				23.23
	VO2				25.31
	VO3				26.53
container (QCIF)	VO0	10.00k	10.07k	24/75	31.57
	VO1				23.97
	VO2				24.42
	VO3				25.96
	VO4				29.29
	VO5				23.96
container (QCIF)	VO0	24.00k	24.27k	77/100	31.43
	VO1				23.90
	VO2				27.51
	VO3				26.69
	VO4				29.45
	VO5				28.75
news (CIF)	VO0	48.00k	48.46k	53/75	35.82
	VO1				28.44
	VO2				28.40
	VO3				35.05

Hung-Jin Lee  
Signature of Inventor

5-19-97  
Date

Ti-Lee Chy  
Signature of Inventor

5-19-97  
Date

Signature of Inventor  
Witnessed and understood by:

Date

Xudong Song  
Signature of witness

Full Name of witness

Date

5/20/97  
Date

## APPENDIX B - Page 2

## David Sarnoff Research Center Invention Disclosure

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Docket No.

**EACH PAGE MUST BE SIGNED BY EACH INVENTOR AND WITNESSED**

## (2) Simulation results for high bitrate video coding

sequence	object	target bits	actual rate	frame rate	PSNR
akiyo (QCIF)	VO0	64.00k	64.08k	149/150	41.24
	VO1				37.03
coastguard (CIF)	VO0	384.00k	388.52k	269/300	28.02
	VO1				28.04
	VO2				30.75
	VO3				29.32
container (QCIF)	VO0	64.00k	64.21k	149/150	31.85
	VO1				26.25
	VO2				33.75
	VO3				31.14
	VO4				33.10
	VO5				41.91
news (CIF)	VO0	192.00k	192.08k	147/150	39.16
	VO1				34.32
	VO2				32.98
	VO3				44.86

Hung In Lee 5-19-97  
 Signature of Inventor Date

Ti-Lao Ching 5-19-97  
 Signature of Inventor Date

Signature of Inventor Date

Signature of Inventor Date

Witnessed and understood by:

Xudong Song  
 Full Name of witness

Signature- of witness Date